E **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 51S01

M.E. DEGREE EXAMINATION, NOV 2018

First Semester

Communication Systems

15PCM101 - ADAPTIVE SIGNAL PROCESSING

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1.	(a)	Explain shank's method for solving normal equations.	CO1- U	(20)
		Or		
	(b)	Obtain the expression for all –pole modeling using prony's method.	CO1- U	(20)
2.	(a)	Explain how the Yule-Walker equations can be solved using Levinson-Durbin algorithm.	CO2- App	(20)
		Or		
	(b)	Derive the variance of the periodogram using Blackman-Tukey method.	CO2- U	(20)
3.	(a)	Let us consider linear prediction in noisy environment. Suppose that a signal is corrupted by noise. $x(n)=d(n)+w(n)$, where $r_w(k)=0.5\delta(k)$ and $r_{dw}(k)=0$. The signal d(n) in an AR(1) process that satisfies the difference equation $d(n)=0.5d(n-1)+v(n)$, where v(n) is white noise with variance $\sigma_v^2=1$. Assume that w(n) and v(n) are uncorrelated. Design a first order FIR linear predictor $W(z)=w(0)+w(1)z^{-1}$ for d(n) and find the mean square prediction error = { (+ 1) − (+ 1) }.	CO3- App	(20)
		Or		

	(b)	Let us consider linear prediction in noisy environment. Suppose that a signal is corrupted by noise. $x(n)=d(n)+w(n)$, where $r_w(k)=0.5\delta(k)$ and $r_{dw}(k)=0$. The signal d(n) in an AR(1) process that satisfies the difference equation $d(n)=0.5d(n-1)+v(n)$, where v(n) is white noise with variance $\sigma_v^2=1$. Assume that w(n) and v(n) are uncorrelated. Design a causal Wiener predictor and compute mean square error.	CO3- App	(20)
4.	(a)	Discuss adaptive noise cancellation using LMS algorithm.	CO4- U	(20)
		Or		
	(b)	Explain the RLS algorithm with the exponentially weighted factor.	CO4- U	(20)
5.	(a)	Explain the concept of multirate signal processing with spectral interpretation of decimation of a signal from 6 KHz to 2KHz and spectral interpretation of interpolation of a signal from 2 KHz to 6 KHz.	CO5- App	(20)
		Or		
	(b)	Consider a Decimator with down sampling factor 3 and a 12^{th} order filter. After deriving necessary equations draw the structure of the Decimator with the derived poly phase filters.	CO5- App	(20)